

Appendix C-6: Active Transportation and Public Health Metrics Research

Introduction

Substantial evidence ties public health to the social, economic, and physical environment in which residents live. In FY 2012-13, the state Strategic Growth Council (SGC) awarded SACOG a 2nd round Sustainable Community Planning Grant. Tasks in SACOG's grant scope included researching and assessing emerging infill and public health-related tools, metrics, and data sources that might enhance SACOG's analytic capacity and support regional and local planning efforts and performance measurement. The SGC also helped fund a collaborative state-level effort to develop a public health assessment model, described in more detail in this appendix.

This Appendix provides a summary of SACOG's scan of the most relevant active transportation- and public health-related metrics and efforts that SACOG has identified to date. It includes SACOG's initial assessment of the different tools and methodologies for potential technical feasibility, usefulness, and affordability, and outlines SACOG's anticipated next steps for continued exploration and implementation of new tools and metrics.

Background on SACOG Performance Measurement

The Sacramento Region Blueprint Vision, adopted in 2004, relied on the latest research at the time to forecast effects on travel outcomes (e.g., vehicle miles traveled, transit mode share, congestion, and non-motorized mode share), based on changes to future land use patterns. Since that time, the body of knowledge and research on the land use-transportation connection and its benefits has expanded and matured. Results of a 2010 meta-analysis by Robert Cervero and Reid Ewing in the *Journal of the American Planning Association* examined land use/transportation factors including residential accessibility and density, street pattern/urban design, mix of use, and proximity to transit. These were included in the analysis of the 2012 MTP/SCS.

Coinciding with the adoption of the 2012 MTP/SCS was the passage of the federal transportation bill, *Moving Ahead for Progress in the 21st Century* (MAP-21). The legislation signaled a new federal and state emphasis on outcome-based performance measurement and has led to a series of rule-making activities and updated funding programs that elevate the importance of performance-based planning. Other markers of this paradigm shift have been active efforts to emphasize performance in revisions to the State Transportation Improvement Program (STIP) and state Cap and Trade legislation that dedicated a full 35 percent of total funding to programs that help meet the greenhouse gas performance targets of Senate Bill 375.

SACOG has steadily increased its planning focus on prioritizing land use-supportive, feasible and cost-effective transportation projects with high performance, including VMT and greenhouse gas emission reduction, mobility, access, active transportation, and public health benefits. The 2016 MTP/SCS has continued to emphasize the importance of prioritizing cost-effective transportation investments in a time of funding constraints.

Performance evaluation tools and metrics are a promising means to support and encourage the region's momentum on implementing the Blueprint Vision. SACOG currently uses indicators for many purposes, including for:

- Assessing and communicating the outcomes of different MTP/SCS scenarios;
- Analysis of the performance of each MTP/SCS;
- Developing the Regional Monitoring Report produced by SACOG about every two years;
- Helping assess and score applications for transportation funding programs;
- Meeting federal and state requirements; and
- Many other regional planning efforts and studies.

Table C-6.1 summarizes the metrics SACOG used for development and analysis of the 2016 MTP/SCS and the most recent Regional Monitoring Report. As the table seeks to make clear, there are differences in what SACOG can *forecast* or project will happen in the future, compared with what we can *monitor* to assess change over time.

SACOG's three goals in its Strategic Plan are to:

- 1) Sustain the agency's emphasis on information-based decision making by providing state-of-the-art data and tools to members, partners, stakeholders, and residents to help them shape the future of their communities and the region.
- 2) Maximize strategic influence for the region through developing and implementing integrated regional transportation plans that produce unique and significant quality of life benefits for residents of the region.
- 3) Serve as a source of high quality information, convener, and/or advocate on a range of regional issues when the agency's involvement would provide unique, added value to promoting a sustainable future for the region.

SACOG continually seeks to enhance its analytical expertise and capacity. Among SACOG's objectives is continuing to augment its tools and metrics to:

- Forecast and measure MTP/SCS outcomes, including public health-related outcomes.
- Support design, phasing, and funding for the most effective transportation investments and leveraging opportunities to help implement the MTP/SCS.
- Enhance guidance and funding opportunities for complete street improvements.
- Help improve the safety of the transportation system.
- Help improve disadvantaged community opportunities.
- Identify transportation-related climate adaptation options.
- Help increase regional awareness of housing and affordability issues.
- Monitor implementation of the MTP/SCS and progress towards achieving the Regional Blueprint Vision and regional greenhouse gas emission (GHG) reduction targets.
- Expand SACOG data and tools available to SACOG member agencies for local planning and monitoring work.

Table C-6.1 MTP/SCS and Monitoring Report Metrics

Land Use Measures

Focus	Specific Indicators	MTP/SCS Scenarios	2016 MTP/SCS	Monitoring Report
Housing	Growth in housing units by Community Type	X	X	
	Change in housing product mix and by Community Type		X	
	Housing growth through reinvestment		X	
	Housing dwelling growth by product type	X		X
	Dwelling unit growth by county			X
	Growth and average annual growth in number and share of detached and attached dwellings			X
	Average vacancy rate			X
Employment	Employment growth in different Community Types by sector		X	
	Employment growth by Community Type		X	
	Employment growth through reinvestment		X	
	Jobs by County			X
Land Usage	Compact development: growth in population compared with acres developed		X	
	Farmland acres developed – total and per capita	X (sq miles)	X	
	Vernal pool acres developed	X (sq miles)	X	
	Developed acres by Community Type		X	
Mix of uses	Jobs-Housing balance within four-mile radius of employment centers		X	
	Mix of use by Community Type		X	
Transit-Oriented Development	New housing product mix in TPAs by county		X	
	Growth in dwelling units and in employees within 1/2-mile of quality transit (in TPA) by county		X	
	Proximity to transit by Community Type		X	
Urban Design	Change in street pattern in different Community Types		X	
	Change in residential density by Community Type		X	

Transportation Measures

Focus	Specific Indicators	MTP/SCS Scenarios	2016 MTP/SCS	Monitoring Report
Vehicles Miles Traveled (VMT)	Total weekday VMT & average annual growth rates – regionally, by county, and per capita		X	
	Weekday VMT by source and total		X	
	Commute share of household-generated VMT Weekday VMT by source per capita or per job Total VMT per capita		X	
	Percent change in VMT per capita or per job compared to 2012	X	X	
	Weekday household-generated VMT per capita by Community Type Weekday household-generated VMT per capita by TPA		X	
	Household-generated commute VMT by Community Type and regional total Commute VMT per worker by Community Type and regional total		X	
	Change in average daily VMT by county			X
	Change in daily VMT traveled by state/non-state roadway			X
	Change in daily total VMT per capita			X

Transportation Measures (continued)

Focus	Specific Indicators	MTP/SCS Scenarios	2016 MTP/SCS	Monitoring Report
Congested Vehicle Miles Traveled (VMT)	Congested VMT total and per capita	X	X	
	Congested VMT by source - total, per capita, per job		X	
	Congested VMT for household-generated travel by Community Type		X	
	Change in weekday vehicle hours of delay on state routes			X
	Change in total and per traveler delay			X
Driving access	Total jobs within 30-minute drive by Community Type		X	
Travel Time	Travel time spent in car per capita	X	X	
	Change in commute travel times, % of workers by commute travel time			X
	Change in commute time by county			X
Vehicle Ownership	Vehicles available per household regionally, by county			X
Transit Service and Productivity	Increases in transit vehicle service hours per day, by transit type	X	X	
	Weekday transit vehicle service hours		X	
	Weekday passenger boardings		X	
	Weekday boardings per service hour		X	
	Farebox revenues as percent of operating costs (farebox recovery rate)	X		
	Change in annual fixed route vehicle service hours by operator			X
	Change in annual fixed route vehicle service miles by operator			X
	Annual total fixed route passenger boardings by operator			X
	Change in total vehicle service hours, vehicle service miles, passenger boardings in region, by LRT, bus and total			X
	Change in total vehicle service hours, vehicle service miles, & passenger boardings per capita in region, by LRT, bus & total			X
	Change in total passengers per vehicle service hour, vehicle service mile in region, by LRT vs. bus			X
	Change in annual Capitol Corridor passengers to, from & within the Sacramento region			X
Travel Cost	Change in one-way fare for RT, Yolo bus local & express, and Roseville local & commuter service			X
	Change in annual and weekly California gas price			X
Bicycle Infrastructure	Increases in miles of bicycle route mileage by county Bike route miles per 100,000 population		X	
	Additional miles of bicycle paths, lanes and routes	X		
Road and Highway Infrastructure	Lane miles of new or expanded roads and highways	X	X	
	Change in Maintained road mileage by county			X
Transit, walk and bike travel	Weekday person trips by transit, walk and bike modes		X	
	Transit, walk and bike trips per capita		X	
	Transit, bike and walk trips per capita by Community Type Transit trips per capita by Transit Priority Area (TPA)		X	
	Transit, bike and walk trips per capita by Community Type		X	
	Transit trips per capita by Transit Priority Area (TPA)		X	
	Share of trips by transit, bike or walk	X		
	Minutes of active transportation		X	

Transportation Measures (continued)

Focus	Specific Indicators	MTP/SCS Scenarios	2016 MTP/SCS	Monitoring Report
Roadway Utilization/ Optimal use	Underutilized, optimally utilized, over-utilized roadways by roadway type		X	
Commute Travel	Weekday commute tours by mode		X	
	Commute mode shares		X	X
	Percent of workers traveling to work by different modes by county			X
Non-Commute Travel	Weekday non-commute person trips by mode		X	
	Non-commute mode share		X	
Safety	Percent reduction in accident rates		X	
	Change in fatal and injury collisions, collision rates			X
	Change in fatal and injury collisions by county			X
	Change in pedestrian-involved and bicycle-involved fatal and injury collisions, collision rates			X
Transportation Budget	Spending in billions for road capacity, transit operations, transit capital, bicycle and pedestrian, system maintenance and programs	X	X	

Environmental Measures

Focus	Specific Indicators	MTP/SCS Scenarios	2016 MTP/SCS	Monitoring Report
Farmland impacts	Farmland conversion		X	
	Acres of impact from growth and transportation projects by type of farmland Percent of Williamson Act contract acres impacted		X	
Habitat impacts	Percent of habitat and land cover impacted		X	
	Acres of impact from growth and transportation projects by type of wildland habitat/land cover		X	
Floodplain development	Percent of housing units expected to be constructed in 200-year floodplain		X	
Toxic air contaminants	Percent of population within 500 feet of high-volume roadway by county, region		X	
Greenhouse gas emissions	Greenhouse gas emissions by sector		X	
	Greenhouse gas emission reductions per capita by pounds per day, percentage		X	
	Percent change in weekday passenger vehicle CO ₂ emissions per capita	X		

Environmental Justice Measures

Focus	Specific Indicators	MTP/SCS Scenarios	2016 MTP/SCS	Monitoring Report
Land Use	Percent of LIHM and Non-LIHM Area population in Community Types		X	
	Percent of LIHM and Non-LIHM Area population in TPAs by county			
Housing	Housing product mix in LIHM & Non-LIHM Areas by Community Type		X	
	Total homes in LIHM Areas near high frequency transit	X		
Transit service	Increases in daily transit vehicle service hours in LIHM Areas		X	
Transit accessibility	Accessibility from LIHM and Non-LIHM Areas within 30 minutes by transit to jobs, retail jobs, medical jobs, higher education, park acres		X	
Mode share	LIHM and Non-LIHM Area transit mode share		X	
	Bike and Walk mode share in LIHM and Non-LIHM Areas		X	
Auto accessibility	Accessibility from EJ and Non-EJ Areas within 30 minutes by car to jobs, retail jobs, medical jobs, higher education, park acres		X	
Comparison of transit and auto accessibility	Percent of jobs, retail jobs, medical jobs, higher education enrollments, park acres Accessible within 30 minutes by transit vs. car from EJ and Non-EJ Areas		X	
Toxic air contaminants	Percent of population in EJ and Non-EJ areas within 500 feet of high-volume roadway by county, region		X	

Economic Measures

Focus	Specific Indicators	MTP/SCS Scenarios	2016 MTP/SCS	Monitoring Report
Employment	Change in jobs by sector		X	X
	Change in employed residents by county			X
	Change in monthly unemployment rate by county			X
	Change in working age population by county			X
	Change in employment to population rate by county			X
	Change in workers per job by county			X
Income	Change in median household income (nominal & inflation-adjusted) by county			X
	Change in 10th percentile, median & 90th percentile incomes			X
	Change in household income distribution (20th percentile, median and 80th percentile)			X
	Change in aggregate household income (nominal & inflation-adjusted) by county			X

Demographic Measures

Focus	Specific Indicators	MTP/SCS Scenarios	2016 MTP/SCS	Monitoring Report
Population	Population Growth by County			X
	Growth in households			X
	Change in average household size			X
	Age distribution			X
	Age of householder, % of households by age of householder			X

A. Healthy Communities Data and Indicators Project

A major effort in California that SACOG has been following is entitled Health in All Policies. A California Health in All Policies (HiAP) Task Force was created in 2010. Housed under the SGC, it brings together state agencies, departments, and offices to identify priority programs, policies, and strategies to create a healthier and more sustainable California. The California Department of Public Health (CDPH) staffs the Task Force in partnership with the Public Health Institute (PHI).

As part of its work, HiAP developed a Healthy Community Framework, which defines a healthy community as one that provides for the following through all stages of life:

- Meets basic needs of all
 - Safe, sustainable, accessible and affordable transportation options
 - Affordable, accessible and nutritious foods
 - Affordable, high quality, socially integrated and location-efficient housing
 - Affordable, accessible and high quality health care
 - Complete and livable communities
 - Access to affordable and safe opportunities for physical activity
 - Able to adapt to changing environments, resilient, and prepared for emergencies
- Quality and sustainability of environment
 - Clean air, soil and water, and environments free of excessive noise
 - Tobacco and smoke free
 - Green and open spaces, including agricultural lands
 - Minimized toxics, GHG emissions and waste
 - Affordable and sustainable energy use
- Adequate levels of economic, social development
 - Living wage, safe and healthy job opportunities for all
 - Support for healthy development of children and adolescents
 - Opportunities for high quality and accessible education
- Health and social equity
- Social relationships that are supportive and respectful:
 - Robust social and civic engagement
 - Socially cohesive and supportive relationships, families, homes and neighborhoods
 - Safe communities, free of crime and violence.¹

The Healthy Communities Data and Indicators (HCI) project is a two-year collaboration of

¹ http://sgc.ca.gov/docs/Healthy_Community_Framework_2013.pdf

CDPH and the University of California, San Francisco to create and disseminate indicators linked to this Healthy Communities Framework. A draft list of core indicators² was completed in 2014 to measure each of the Framework goals listed above.

Initial SACOG Assessment

Staff reviewed this indicators list and found that SACOG has already used a number of these indicators in its analytical work, including measures of: travel miles and mode use; access to public transit, jobs, higher education, parks, and food; road traffic injuries and fatalities; air pollution and greenhouse gas emissions; proximity to busy roadways; climate and infrastructure hazard mitigation; agricultural land conversion; unemployment and poverty rates; educational attainment rates; housing and transportation cost burden; and housing to jobs ratio.

The HCI project has begun to produce excel spreadsheets with data (largely at a county or city level) for a number of the indicators, and is continuing to construct more indicators. The HiAP Task Force also developed a 2014-16 Active Transportation Action Plan, endorsed by the SGC in October 2014, which includes an objective to “Identify strategies to collect data, monitor progress, and evaluate outcomes for active transportation programs.”³

SACOG continues to monitor the activities of HiAP and the HCI project and especially anticipates exploring indices for neighborhood completeness, environmental resilience, and active transportation programs as they become available.

² http://www.cdph.ca.gov/programs/Documents/Healthy_Community_Indicators_Core_list10-17-14Table1-5.pdf

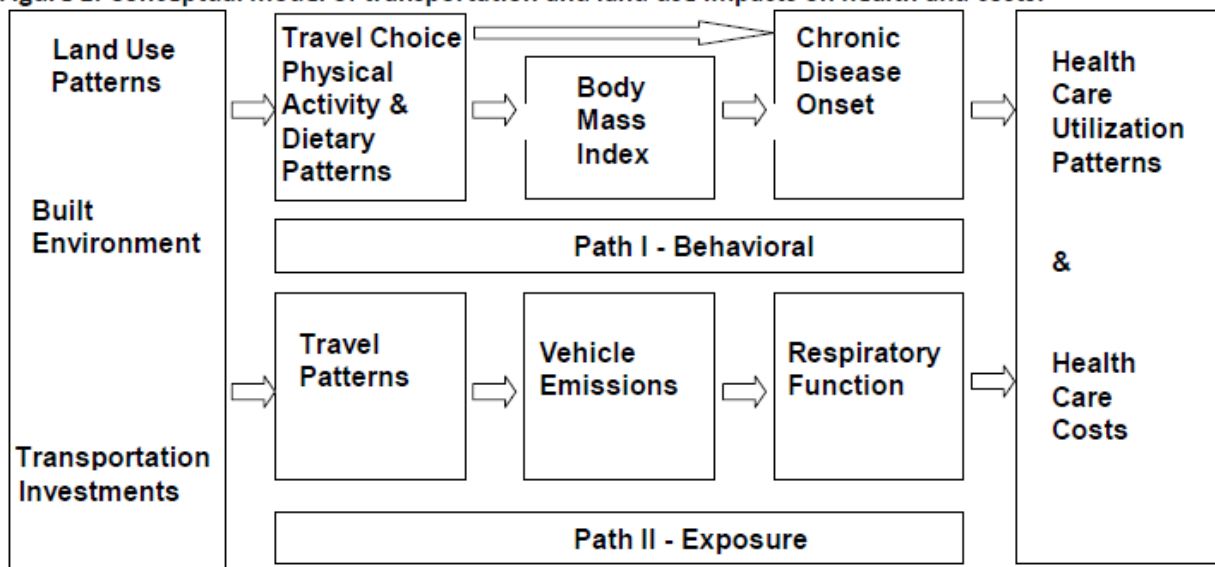
³ http://sgc.ca.gov/docs/Active_Transportation_Action_Plan_9-26-14.pdf

B. Public Health Assessment Models

1. California Public Health Assessment Model

Significant research has been conducted in recent years into the relationships between built environment characteristics and public health outcomes, including physical activity, obesity, and respiratory health. Figure C-6.1 provides a conceptual model of these relationships from the research literature.

Figure 1. Conceptual model of transportation and land use impacts on health and costs.



Source: Urban Design for Health and Calthorpe Analytics

SACOG has participated in an effort to develop a California Public Health Assessment Model. The goal of this effort has to been to develop a scenario planning tool that can assess and compare how changes in the built environment resulting from different land use and transportation investments will impact public health outcomes.

The project was undertaken in partnership with the California Strategic Growth Council (SGC), Resources Legacy Fund, Calthorpe Analytics, Urban Design for Health (UD4H), and Southern California Association of Governments (SCAG). Also serving on the Steering Committee were representatives of the Governor's Office of Planning & Research, California Health and Human Services Agency, California Department of Public Health, and San Diego County Department of Public Health. A technical advisory committee of experts statewide also helped advise the project development, testing and evaluation.

Scenario planning used by SACOG and other MPOs and agencies provides a way to assess the travel, environmental, and other impacts of development, and test a range of land use and transportation scenarios to help inform planning and investment decisions. Scenario planning may be conducted at a state, regional, county, city, corridor, or even neighborhood level. Decision-maker and public interest has increased in assessing how plans like the MTP/SCS affect health outcomes,

but analytical tools have been limited. This led to SACOG's interest in this collaboration on a Public Health Assessment Model.

The Public Health Assessment Model seeks to predict the impacts from different land use and transportation scenarios on physical activity and minutes of walking or biking; minutes of driving; walking to school; and future case health outcomes, such as reductions in obesity and chronic health conditions like type 2 diabetes, high blood pressure, and heart disease.

Development of the model was a highly technical and iterative process involving numerous steps, including:

1. Data development, which included:

- Developing a highly detailed built environment database, including parcel/grid-level land use information, transportation system data, and demographic data to produce population profiles.
- Spatially incorporating data from the California Health Interview Survey (CHIS). CHIS is a biannual survey, the largest in the country, designed to capture information on individual health-related behaviors and health outcomes for adults, teens aged 12-17, and children ages 11 and younger.
- Spatially incorporating information from the California Household Travel Survey, most recently conducted by the California Department of Transportation in 2010-2012. The survey provides detailed information on household socioeconomic characteristics and trip-making - whether by driving, walking, biking, transit or other modes - to help inform transportation modeling and planning.

2. Exploratory analysis and testing.

3. Model development.

4. Model validation.

5. Pilot testing. The model was tested for two geographic areas: Orange County, and 19 sub-areas in Sacramento County.

Key built environment inputs found to have significant impacts on travel and health outcomes included:

	Retail/office floor-to-area ratio
	Net residential density
	Mixed land use index
Destination and Accessibility	Distance to nearest education (truncated at 2000m)
	Distance to nearest retail (truncated at 2000m)
	Dwelling units
	Employment
	Residential access
	Commercial access index
	Regional access index
	Walkability index (standard)
Transit	Count of transit stops/stations w/n 1km
	Distance to nearest transit (truncated at 2000m)
	Transit access index
	Rail within 1km (0=no, 1=yes)
Roadways	Intersection density (intersections per square mile)
	Network connectivity index
	Major road exposure index
Parks	Acreage of park within 1km buffer
	Distance to nearest park (truncated at 2000m)
	Park access index

Source: UD4H and Calthorpe Analytics

In July 2015, UD4H and Calthorpe Analytics produced a summary report on the model development effort, and provided SACOG with data from the pilot testing effort. While this came too late for analyzing outcomes of the draft MTP/SCS, SACOG intends to assess the data provided, and explore how the Sacramento pilot might be used or enhanced in the future for analyzing the public health outcomes of the next MTP/SCS or other SACOG planning efforts.

2. Integrated Transport and Health Impact Modeling Tool (ITHIM)

SACOG has been actively engaged in the effort to develop the Public Health Assessment Model. However, SACOG also explored ITHIM, described below, as a potential tool for assessing the impacts of MTP/SCS land use and transportation scenarios and strategies on health.

Summary

The California Department of Public Health worked with the British-based Centre for Diet and Activity Research (CEDAR) to develop an Integrated Transport and Health Impact Modeling Tool (ITHIM). ITHIM seeks to quantify the potential health-related co-benefits and harms of varying strategies to reduce transportation-related greenhouse gas emissions.

ITHIM integrates data on travel patterns, physical activity, fine particulate matter, greenhouse gas emissions, and disease and injuries. ITHIM then models the impact of different transportation scenarios on physical activity, fine particulate matter (PM_{2.5}) air pollution exposure, and road traffic-related injuries. Outcomes are generally expressed as increases or decreases in deaths/premature deaths, years of life lost, years living with a chronic disease, and disability-adjusted life years, that is, the number of years lost due to ill-health, disability or early death. CEDAR has continued to work on new versions of ITHIM through U.S. and international collaborations.

Initial SACOG Assessment

Following the 2012 MTP/SCS, SACOG assessed using ITHIM as an alternative to the Public Health Assessment Model effort, but identified a number of limitations in that ITHIM:

- Did not include land use-public health interactions
- Did not include other contexts for increasing physical activity, such as non-travel factors
- Could not be used to evaluate subareas of the region.

Staff has continued to monitor ITHIM's use in California and Nashville, Tennessee. Some versions of ITHIM now predict changes in CO₂ emissions. However, in California, CalEEMod was developed in collaboration with the state's air districts to serve as a uniform land use emissions computer model for statewide use. CalEEMod quantifies potential greenhouse gas (GHG) and criteria pollutant emissions associated with construction and operations from various land use projects and the benefits of different mitigation measures.

Sources

ITHIM: <http://www.cedar.iph.cam.ac.uk/research/modelling/ithim/>

Health Cobenefits and Transportation-Related Reductions in Greenhouse Gas Emissions in the San Francisco Bay Area: <http://www.ncbi.nlm.nih.gov/pmc/articles/PMC3673232/>

CalEEMod: <http://www.caleemod.com/>

C. Health-Focused Performance Indicators

Several cities have developed health-related metrics and tools for assessing or monitoring local communities, plans and/or projects. Two approaches are described below.

1. San Francisco Indicator Project

Summary

The San Francisco Department of Health leads the San Francisco Indicator Project. The project measures how San Francisco performs in eight dimensions defined as making up a healthy, equitable community: environment, transportation, community, public realm, education, housing, economy and health. Each of the eight categories includes one or more objectives, specific indicators for each objective. The department has also produced maps and data tables for many of the indicators.

The Department also created a Healthy Development Checklist for residential, commercial, institutional or industrial projects, or the transportation element of a land use plan, with specific questions/criteria for each category.

Initial SACOG Assessment

- The Healthy Development Checklist is designed for local agencies to assess individual local land use projects and associated transportation elements.
- Some of the general indicators might be adaptable for regional use and/or to provide data or mapping to support local or smaller area planning efforts but a focused effort to develop extensive local data sets across the six counties would be needed to create a local version of this tool.

Source

<http://www.sfindicatorproject.org/>

http://www.sfindicatorproject.org/resources/development_checklist

2. PHILATool

Summary

The **Planning & Health Indicator List & Assessment Tool** (PHILATool) is part of a Healthy Planning Toolbox developed by the City of Philadelphia as part of Philadelphia2035, the city's comprehensive plan. Modeled on San Francisco's work, PHILATool matches 20 of the Plan's citywide objectives with 71 measurable indicators to monitor progress towards each objective.

To assist planners, decision-makers, and the public in understanding the connections between the built environment and public health, PHILATool also incorporates demographic data from the Census and local data on health outcomes from the Philadelphia Health Management Corporation Household Health Survey 2010 and Philadelphia Department of Public Health. The data can also support specific Health Impact Assessments (HIAs).

The other toolbox components, a Bicycle Environmental Audit Tool and a Walkability Assessment Tool, provide guidance for field surveys of bicycle and pedestrian conditions.

Initial SACOG Assessment

- This tool provides a good case study for local jurisdictions who are designing performance monitoring programs for infrastructure investments in specific areas.
- Some of the indicators might be adaptable to the MTP/SCS. Others are very local in nature and would require significant data collection from member agencies, whose data resources vary significantly.

Source

<http://phila2035.org/home-page/communities/healthtoolbox/>

D. Evolution from Level of Service: Complete Streets, Modal Shifts and Active Transportation

An increasing focus of the public health community has been on complete streets, which support increased physical activity through walking, biking, and transit use. SACOG expects road rehabilitation project applications submitted for regional funds to include complete street improvements; scoring systems for regional funding programs include criteria for multimodal improvements.

SACOG provides complete streets support to member agencies through technical assistance and resource-sharing. For example, in coordination with the local Complete Streets Coalition, SACOG developed an online complete streets toolkit. Toolkit resources are selected to provide local communities with models and best practices for complete streets policies, design, planning, funding and implementation efforts. Initially funded through a Caltrans discretionary planning grant, the toolkit was significantly updated in 2014 with support from the SGC. SACOG staff also works with member agencies every two years to update the Regional Pedestrian, Bicycle and Trails Master Plan, which lists projects eligible for regional funding.

In 2015, SACOG staff identified potential “opportunity areas” where complete street efforts might particularly be focused across the region, and discussed with the SACOG Board developing a regional Complete Streets Funding Program. However, SACOG is continuing to look at how to enhance its capacity to assess where best to focus planning and investment, and how best to assess and compare projects for funding when limited regional funds are available and monitor the progress/outcomes of those investments. SACOG has continued to appraise new tools and metrics to help address key questions such as:

- How can SACOG determine the submitted projects should have highest priority for investments, given limited resources?
- What criteria or measures might be used for regional funding programs, or a new Complete Streets Funding Program, that could further help with equitable scoring of widely divergent project applications, e.g., rural rehabilitation projects or small downtown projects, compared with large-scale urban or suburban corridor rehabilitation or expansion projects?
- What measures might best help predict transit, walk and bike trip changes and active transportation benefits as a result of projects, and could be used by all jurisdictions at minimal cost?

- How can SACOG support local jurisdictions in prioritizing and designing the most effective projects for shifting mode share and reducing VMT and GHG, given limited local resources?
- Through what measures would SACOG assess and monitor the region's progress on complete streets and an affordable, effective multimodal transportation network for the region's residents?

For many years, a standard measurement for existing conditions and project benefits has been roadway Level of Service (LOS), an A to F rating system measuring vehicle delay at intersections and on roadway segments. With the increasing interest in modal choices and active transportation, tools and metrics have been evolving. The following section describes a variety of approaches that have emerged for assessing, projecting or monitoring multiple mode conditions or usage and active transportation, particularly bicycling and walking.

D1. Extending Level of Service to Other Modes

A number of approaches, summarized below, expand the LOS concept to other modes as an alternative to focusing solely on vehicle-related level of service.

1. Multi-Modal Level of Service (MMLOS)

Summary

Multi-Modal Level of Service (MMLOS) was developed through a National Cooperative Highway Research Program (NCHRP) Project and is used in the 2010 Highway Capacity Manual (HCM). MMLOS expands the commonly used vehicular Level of Service (LOS) measure to assess how well facility designs and operations meet the needs of the four primary modal users of the shared public right-of-way: auto drivers, transit passengers, bicyclists and pedestrians. MMLOS provides a Level of Service (LOS) ranking of A to F for each mode— auto, transit, bike and pedestrian. MMLOS can be used either for planning or operational analysis. LOS measures are calculated separately for each side of the street.

The Flagstaff, Arizona, MPO in its 2009 Flagstaff Pathways 2030 Regional Transportation Plan included multimodal LOS guidance for transit service, bicycle and pedestrian facilities, and roadways for rural, suburban, and urban communities. The plan includes maps projecting future transit, pedestrian and bike LOS, with areas identified as high, moderate or minimum.

Initial SACOG Assessment

The MMLOS model:

- Seeks to balance level of service across modes, not just consider the needs of drivers.
- Considers many factors and uses very detailed measures of roadway geometry, usage, intersection control, and current conditions, and transit stops, services, and performance on the roadway segment.
- Requires intensive data collection that SACOG and local agencies are unlikely to have the resources to undertake, and is not readily customizable.
- Does not assess other users of the roadway, such as commercial vehicles, truck drivers, auto passengers, recreational travelers, or messenger/delivery services.

- Most heavily weights low volumes of average daily traffic (ADT) for better MMLOS scores. In SACOG’s tests, even segments with relatively moderate traffic volumes (8,000-14,000 ADT) would find it difficult to score above average MMLOS. Only segments with very low volumes (4,000-6,000) scored well in the MMLOS model analysis.
- Does not take into account surrounding land uses or assess the “usefulness” of pedestrian facilities. In SACOG’s tests, auto-dependent neighborhoods with good pedestrian facilities but lacking the businesses and services that attract and generate pedestrians except fitness walkers, would still score well but not necessarily be useful for pedestrian trips.
- Is very technical and better suited to traffic engineers doing analysis for a specific project, where only a small segment of a street is being considered.

Sources

MMLOS Users Guide: http://onlinepubs.trb.org/onlinepubs/nchrp/nchrp_w128.pdf
 Final TRB Report: http://onlinepubs.trb.org/onlinepubs/nchrp/nchrp_rpt_616.pdf
 Flagstaff RTP: <http://www.flagstaff.az.gov/Archive.aspx?AMID=41>

2. Pedestrian Performance Measure (PPM)

Summary

The Pedestrian Performance Measure (PPM) comes from Transportation Research Record 1538, entitled “Bicycle and Pedestrian Level-of-Service Performance Measures and Standards for Congestion Management Systems.” Like the MMLOS model, the PPM model output is a numerical value that is translated into a letter grade level of service (LOS). The PPM model, however, uses a simpler point system (0-21) that assigns values to street design features, existing physical conditions and amenities, auto LOS, and Transportation Demand Management programs and treatments.

Initial SACOG Assessment

- The PPM model assigns points based on automobile LOS rather than separating out traffic volumes, number or lanes, and congestion level. Doing so assumes: 1) that all roads operating at an automobile LOS A, B, or C are safe for pedestrian travel or 2) that all high-volume roads unsuitable for pedestrian travel will score an automobile LOS D, E, or F.
- Like MMLOS, the PPM model does not take into account surrounding land uses nor does it assess the “usefulness” of pedestrian facilities. All else being equal, SACOG’s assessment showed that the PPM model would likely score a well-connected downtown street network and a sprawling business park similarly, even though a downtown street with many connected destinations would likely be much more appealing to pedestrians.

Source:

<http://trrjournalonline.trb.org/doi/abs/10.3141/1538-01?journalCode=trr>

D2. Third-Party Scoring Systems

1. WALK SCORE

Summary

Walk Score provides online scores for any address in the U.S., Canada and Australia on a 0-100 scale, based on how positive they are for walkability, transit, and biking. Redfin, a real estate brokerage company, bought Walk Score in October 2014. Redfin and many other agencies now include Walk Scores on their sites.

Walk Score measures walking routes from an input address (or latitude/longitude information) to amenities within walking distance. Amenities identified by Walk Score include the following:

- Restaurants
- Cafes
- Bars
- Grocery stores
- Parks
- K-12 Schools
- Local shopping (excludes many big box membership & home improvement stores)
- Errands (e.g., banks, pharmacies, small hardware stores, laundromats, etc.)
- Entertainment (movie theatres, live theatres, museums, galleries, etc.)
- Car share services
- Bike share services
- Rail transit stops

Points are awarded to amenities in each category based on distance. Addresses with amenities within a quarter-mile walk are awarded the most points. Point awards for amenities decline with distance. Amenities beyond a 30-minute walk of a target address are considered un-walkable and are not awarded points.

Walk Score has also added 100-point scoring systems for transit and biking. For its Transit Score, Walk Score assigns a "usefulness" value to each nearby transit route based on frequency, type (rail, bus, etc.), and distance to the nearest stop, then sums and normalizes the "usefulness" of all nearby routes. To develop its Bike Score, Walk Score equally weights four components: bike lanes, hills, destinations and road connectivity, and bike commuting mode share.

Initial SACOG Assessment

- Walk Score is increasingly being used by private and public organizations, and has good name recognition.
- Walk Score has continued to expand its scoring systems and services and refine its algorithms.
- To monitor progress made on walkability or other measures, consistency is important, or comparisons will not be "apples to apples." Walk Score continues to make changes to its systems, which has made its use for comparisons over time a challenge.

- Walk Score weights similar destinations equally regardless of geography. However, some destination types – bars in particular – may be considered an amenity or problem depending upon the neighborhood.
- Walk Score and Transit Score are patented systems, and multiple other patents are pending. Walk Score will make data available to government and other agencies, but charges for its variety of data products. Buying data could pose a financial challenge for SACOG, especially if repeated purchases are needed to enable the data’s use for ongoing monitoring purposes.

Source

www.walkscore.com

2. Greenroads

The Greenroads Rating System is a third-party, points-based system available to certify sustainable transportation infrastructure projects. The point system is designed to measure the effect of design and construction practices of a range of projects, including new road construction, rehabilitation, bridge and other projects. The system identifies 12 requirements and 45 “voluntary credits” for the project’s approach in six areas: environment and water, construction activities, materials and design, utilities and controls, access and livability, and creativity and effort. The credits earn points toward a rating of Bronze, Silver, Gold or Evergreen.

Initial SACOG Assessment

- Greenroads includes measures for conservation, recycled materials, energy efficiency, innovation, and construction practices for assessing projects.
- The rating system is weighted towards scoring project for low impact development features.
- Since it is a paid service for assessing individual projects, SACOG and many local agencies wouldn’t have sufficient resources to use it for project or funding round assessment. However, some of the voluntary credits could offer options for project assessment or scoring.

Sources

<https://www.greenroads.org/347/the-rating-system.html>

<https://www.greenroads.org/2831/project-checklist-v2.html?>

3. LEED-ND (NEIGHBORHOOD DEVELOPMENT)

Summary

LEED-ND is a third-party verification system of the U.S. Green Building Council. Like LEED for buildings, LEED-ND is a certification system that evaluates new neighborhood-scale land development projects or redevelopment projects that includes residential or nonresidential uses or a mix. The system grants certified, silver, gold or platinum LEED-ND status to those who qualify. Plan certification is available for projects that are currently in any phase of planning and design and up to 75% constructed. Project certification is available for projects that are near completion or were completed within the last three years. LEED-ND has 10 prerequisites for neighborhood-scale projects to be considered for certification. If prerequisites are met, LEED-ND offers points for 50 different potential areas of credit within five main categories:

- Smart Location and Linkage
- Neighborhood Pattern and Design
- Green Infrastructure and Buildings
- Innovation in Design
- Regional Priorities

LEED-ND uses specific aesthetic and physical features as a proxy for the desirability of using active transit modes in the target neighborhood. As part of its assessment program, LEED-ND evaluates “Walkable Streets Features” in terms of site selection and construction of walkable attributes.

Initial SACOG Assessment

- LEED-ND was created to improve and reward innovative neighborhood-scale land development projects.
- LEED-ND is a paid service. Many LEED-ND criteria comprise measurements that are accessible to SACOG. However, to complete the comprehensive neighborhood-level review, the LEED-ND methodology requires an intensive analysis, and would involve a substantial commitment of SACOG and/or local agency staff time.

Sources

<http://www.usgbc.org/resources/leed-v4-neighborhood-development-checklist>
<http://www.usgbc.org/articles/getting-started-nd>

D3. PUBLIC DESTINATION-BASED ASSESSMENT METHODS

Many public agencies have sought to develop in-house assessment tools and metrics to assess walkability and bikeability in terms of access to destinations. Two notable examples are described below.

1. Walkable Destinations

Summary

The Metropolitan Transportation Commission (MTC) undertook its own effort to assess and map the level of walkability to destinations. Categories were taken from the Transportation 2030 Equity Analysis report, which compared the number of businesses by MTC’s identified Communities of Concern with the remainder of Bay Area communities. MTC collected data from the state Employment Development Department’s business database, as well as TeleAtlas Parks and Landmarks, for essential destinations in five categories:

- a. Religious, Educational Institutions and Libraries
- b. Health Services
- c. Other Services
- d. Parks
- e. Retail, Dining, and Entertainment.

Each Bay Area intersection was ranked by the total number of destinations within a network distance of one mile, with the number of destinations that are within one-half mile of an intersection weighted more heavily than the number between one-half and one mile. Destinations were also

weighted as follows to reflect more typical frequency of use: Parks 15%; Retail, Dining, and Entertainment 40%; Health Services 10%; Other Services 20%; Religious, Educational Institutions, and Libraries 15%. Based on intersection calculations, MTC then aggregated the data to calculate average walkability values for communities of concern.

2. THE “20-MINUTE NEIGHBORHOOD”

Summary

The “20-minute Neighborhood” is a different approach that defines a walkable urban environment as one that allows residents to reach daily non-commuting tasks by time, that is within a 20-minute walk or bike ride. The 20-minute figure is used to represent “convenient” active transportation travel distances. A 20-minute neighborhood has no broadly accepted definition so can be tailored to an individual community’s local environment and constraints. The metric offers potential to assess a community’s progress towards long-range transportation and walkability goals. 20-Minute Neighborhoods can be mapped using network analysis and an existing database of residential units and commercial services. Variables needed in order to conduct a 20-minute neighborhood assessment include:

- Which destinations (restaurants, grocery stores, banks, etc.) represent the daily needs of their residents, and must be reachable in a 20-minute neighborhood.
- Which non-auto modal choices (walk, bike, transit?) should be used to measure accessibility within the 20-minute framework.

Portland, Oregon was an early adopter of the 20-minute framework. The Portland Planning office identified the following attributes for identifying 20-minute neighborhoods:

- Full-service grocery stores (chain and single-store operators)
- Neighborhood-serving retail
- Eating & drinking establishments
- Parks
- Elementary schools

Alternatively, the Portland development firm Gerding Edlen, a pioneer of the 20-minute neighborhood concept, defines 20-minute neighborhood amenities as any destination necessary for “a happy and healthy life.”

Initial SACOG Assessment

- Many tools tend to use walking distance as a measure. The 20-minute neighborhood concept uses time to define the urban environment for pedestrians as well as cyclists, who can cover more distance in the same amount of time.
- The concept should be easy for people to understand.
- Defining a consistent threshold and set of destinations to identify walkable destinations or 20-minute neighborhoods across an entire region could be difficult.
- If time and resources are available, these tools are likely easier for local communities to use, since they know conditions better on the ground.

- Destination-based or 20-minute neighborhood concepts might be more relevant for monitoring progress over time than for assessing plan outcomes, since it is difficult to project the locations of new amenities, neighborhood-serving businesses and quality food outlets 10-20 years in the future.
- Assuming a causal link between “walkability” or “bikeability” due to nearby destinations and active mode choices may ignore other factors such as violent crime levels, inadequate pedestrian or bike facilities, or other factors that may limit residents’ willingness to walk or bicycle.

Sources

MTC tool:

http://www.mtc.ca.gov/planning/snapshot/3_Walkability_2006.pdf

<http://www.mtc.ca.gov/planning/snapshot/Appx%20C-Detailed%20Methodology.pdf>

20-Minute

Neighborhood: <http://www.cityofmadison.com/sustainability/community/documents/20minNeigh.pdf>

<http://www.portlandonline.com/portlandplan/index.cfm?a=288098&c=52256>

D4. Tools for Assessing Walkability and Bikeability

The San Francisco Department of Public Health states that for many public health reasons, residents should have equal access to safe, quality pedestrian environments, noting:

Environments that support walking, both as an alternative to driving and as a leisure activity, have multiple, potential positive health impacts. Environments that encourage walking while discouraging driving reduce traffic-related noise and air pollution – associated with cardiovascular and respiratory diseases, premature death, and lung function changes especially in children and people with lung diseases such as asthma. Quality, safe pedestrian environments also support a decreased risk of motor vehicle collisions and an increase in physical activity and social cohesion with benefits including the prevention of obesity, diabetes, and heart disease as well as stress reduction and mental health improvements that promote individual and community health.⁴

Urban form elements affect the safety, speed, and convenience of pedestrian and bicycle travel. A number of tools utilize inventories and field surveys that examine whether the environment and urban form in an area facilitates active transportation modes.

1. Kansas City Walkability Plan Connectivity and Continuity Assessment

Summary

In the Kansas City Walkability Plan (KCWP), officials took an inventory approach to walkability. The plan report identified areas of Kansas City, Missouri that are most walkable or suitable for active transit modes, and those that would be candidates for active transit infrastructure improvements. The plan identifies five components of “walkability”:

⁴ <http://www.sfhealthequity.org/elements/24-elements/tools/106-pedestrian-environmental-quality-index>

- Directness, measuring the ease with which pedestrians move from one point to another within the urban environment, focused on trip time, presence of sidewalks, and sidewalk-to-roadway density ratios.
- Continuity to measure gaps/barriers through the number of intersections per square mile in the target area. Areas with a grid street system will yield high continuity scores, while areas with long blocks, curvilinear streets, and numerous cul-de-sacs will score less well.
- Street Crossings, measuring the frequency and quality of pedestrian roadway crossings.
- Visual Interest, including measurements of scale, attractiveness, design, lighting and maintenance.
- Security, such as crime prevalence and pedestrian safety factors.

Initial SACOG Assessment

- The Kansas City methodology assessed both existing walkable areas and areas for future improvement. The report includes existing facility condition and quality metrics and qualitative measures such as “visual interest.”
- Staff utilized GIS resources to evaluate block lengths, intersection density, and sidewalk lengths.
- This approach is likely more useful to jurisdictions with sufficient local data and resources. SACOG does not have a complete inventory of sidewalks and streetlights for the region. SACOG also does not have data on maintenance, quality or attractiveness of existing facilities, which would require intensive field surveying and could result in inconsistencies if done by different regional or local agency staff.

Source

<http://kcmo.gov/wp-content/uploads/2013/07/walkability.pdf>

2. Bicycle Environmental Quality Index (BEQI)

Summary

The San Francisco Department of Public Health (SFDPH) created a Bicycle Environmental Quality Index (BEQI) to assess the city’s bicycling environment and evaluate streetscape conditions that promote bicycling. The BEQI seeks to assess the relative quality of the biking environment at a street-level scale in San Francisco neighborhoods. The index includes 22 indicators for intersection features, traffic, line of sight, bike parking, retail uses, lighting and signage to help inform neighborhood planning and prioritize improvements. Once a location for analysis is identified, the BEQI Data Manual guides field observers in how to evaluate each factor on the checklist. Field data are then entered into a customized Microsoft Access database (available from SFDPH), and the database calculates scores for street segments and intersections. The scores can then be used to map existing bicycling conditions.

3. Pedestrian Environmental Quality Index (PEQI) 2.0

Summary

Per the SFDPH, data is lacking in San Francisco and many other communities on the existence and quality of street and sidewalk infrastructure for pedestrians. The Pedestrian Environmental Quality Index (PEQI) complements SFDPH’s BEQI as a tool to assess how the physical environment impacts whether people walk in different neighborhoods and to prioritize pedestrian infrastructure

improvements. Like the PEQI, the PEQI uses field surveys by trained observers – in the case of the PEQI, to quantify 31 street and intersection indicators in five categories: intersection safety, traffic, street design, land use and perceived safety. SFDPH has aggregated these indicators to create a weighted summary index, which can be reported as an overall index. As with the BEQI, field data is inputted into a customized Microsoft Access database and automatically scored. The PEQI results in a 0 to 100 score for each street segment and intersection in a defined area, and data can also be mapped.

Initial SACOG Assessment

- The tools measure and compare existing conditions for walking and biking.
- If time and resources are available, they are likely more practical for assessments at a jurisdiction or neighborhood level. Both the BEQI and PEQI require field surveying and training observers for consistency. Conducting field surveys for a region the size of SACOG would likely not be possible given available resources.

Sources

BEQI:

<http://www.sfhealthequity.org/elements/24-elements/tools/102-bicycle-environmental-quality-index>

<http://www.sfhealthequity.org/component/jdownloads/viewcategory/19>

PEQI:

<http://www.sfhealthequity.org/elements/24-elements/tools/106-pedestrian-environmental-quality-index>

<http://www.sfhealthequity.org/component/jdownloads/viewcategory/20>

4. Seattle Pedestrian Master Plan Strategy for Prioritizing Projects

Summary

Seattle's 2009 Pedestrian Master Plan included a methodology for prioritizing projects that combines pedestrian quality measurements with likely pedestrian demand and equity considerations for socioeconomic and health factors. The prioritization process resulted in a list of top tier projects in high priority areas, to focus resources where pedestrian conditions are difficult and people need to be able to walk the most.

The prioritization process uses four steps:

- a. A base analysis of:
 - Corridor function, based on identified street types.
 - Pedestrian demand, based on population and employment forecasts, and weighted for different types of trip generators and 1/8-, 1/4- and 1/2-mile distances.
 - Equity, based on the top quintiles for low auto ownership, low income population, disabled population, diabetes rate, physical activity rate, and obesity rate.
- b. Combining the three analyses into total scores, weighted 40% for potential pedestrian demand, 35% for socioeconomic/health analysis, and 25% for corridor function, to identify High Priority Areas across the city.

- c. A needs assessment to develop “Walking Along the Roadway” and “Crossing the Roadway” scores based on roadway and crossing characteristics (not field data) to develop point scores to approximate improvement opportunities.
- d. Developing a composite ranking to develop the primary project list for the City’s 2030 Plan. The list includes the highest tier roads and intersections in the Along the Roadway and Crossing the Roadway analysis that occurred within the highest tier of the High Priority Area map.

Initial SACOG Assessment

- The methodology added equity and demand considerations to measures of the quality of the current pedestrian environment, and resulted in a prioritized list of pedestrian improvement projects for High Priority Areas across the city.
- Local jurisdictions might find this approach useful as an expanded or alternative model for prioritizing pedestrian projects.
- For some of the measures Seattle used, SACOG does not have comprehensive data files such as for sidewalks, curb ramps, stop signs, etc. Local jurisdictions may also not all have the resources to complete such an analysis.
- Smaller and rural communities would likely yield lower pedestrian demand projections, which could make it more difficult to compete with larger communities if such a methodology became the basis for scoring projects for funding.

Source

Methodology Appendix -

http://www.seattle.gov/transportation/pedestrian_masterplan/pmp_imp_priorities_high.htm

5. Metropolitan Transit Bus Stop Connectivity Prioritization

Summary

Bike Walk Twin Cities funded Metro Transit to conduct a study to prioritize improvements to bus stops, and bicycle and pedestrian connections to bus stops, in the major transit corridors leading into the city of Minneapolis from adjacent jurisdictions. As a starting point for the *Bicycle and Pedestrian Connections to Transit Infrastructure Study*, Metropolitan Transit divided identified bus corridors into three tiers, based on the frequency of service, bicycle and pedestrian count data, and the number of recorded pedestrian and bicycle collisions in the area. The study then had three phases:

1. Agency and community representatives completed questionnaires designed to identify issues for pedestrian and bicycle access to transit and sources of available data.
2. Existing Metropolitan Transit, Metropolitan Council, and community data, supplemented with field data for the three transit corridors, was used for GIS analysis and ranking of bus stops based on their need for improvements.
3. Rankings were expanded with specific recommendations for bus stop and bike/ped facility improvements for different segments within the 11 corridors, including estimated costs of the projects/phases for each corridor, which can be used by local governments for planning and funding applications.

Initial SACOG Assessment

- In 2014, SACOG in partnership with Sacramento Regional Transit (RT) and HackerLab applied for, but did not receive, a Caltrans discretionary planning grant to develop a toolkit for prioritizing bus stop and bike/ped connectivity improvements, given RT's thousands of bus stops. The Twin Cities project could potentially provide a model for such an effort.
- Intensive staff time, partnerships or volunteer efforts would likely be required to develop field data and a similar level of detailed recommendations.
- Transit corridors for focus could be limited to reduce time and resource needs.

Source

<http://www.bikewalktwincities.org/maps-routes/transit-connections/transit-connections-study>

6. Complete, Green Streets Performance Measures Framework for Urban Arterial

Summary

In December 2012, the UC Berkeley Safe Transportation Research & Education Center completed a study for Caltrans entitled *The Effects of Transportation Corridor Features on Driver and Pedestrian Behavior and on Community Vitality*. The project was designed to provide recommendations for a Complete, Green Streets Performance Measures Framework for Urban Arterials for use by Caltrans. The research began with a literature review of studies regarding the effects of roadway design features on driver, cyclist and pedestrian behavior and safety; bike/ped mobility; environmental quality; and community economic vitality. Based on this review, 23 performance measures for evaluating the impacts of transportation corridor design features on the mobility, safety, and economic vitality of Caltrans' urban arterial network were proposed. These were field-tested in two corridors in the Bay Area and Los Angeles, with 19 determined valid and four requiring more research.

Initial SACOG Assessment

- Caltrans supported this study to provide information for its Complete Streets programs.
- Some of the performance measures could potentially be useful to SACOG for funding round criteria or other purposes.

Source

<http://trid.trb.org/view.aspx?id=986737#>

E. Safety

MAP-21 calls for greater performance measurement related to transportation safety and improvements. A number of the commenters on the 2012 MTP/SCS asked for increased information concerning collisions especially related to bicycle and pedestrian injuries and fatalities.

There are numerous current sources for collision data, including the:

- Statewide Integrated Traffic Records System (SWITRS) maintained by the California Highway Patrol;

- Transportation Injury Mapping System (TIMS) created by the Safe Transportation Research and Education Center at the University of California, Berkeley which provides data and mapping tools to facilitate use of SWITRS data;
- National Highway Traffic Safety Administration’s Fatality Analysis Reporting System (FARS).
- Road traffic injury data compiled as part of the Healthy Community Data and Indicators Project, described above.

SACOG currently requires funding round applicants to develop a benefit/cost analysis for safety projects. However, there are certain challenges with SWITRS/TIMS data that should be noted:

- SWITRS provides a more comprehensive tabulation, but TIMS compiles only severe collisions resulting in injury.
- Less severe collisions are underreported, making it difficult to track collisions fully.
- Not all SWITRS or TIMS data points contain latitude/longitude information so not all collisions can be mapped.

One key interest for a number of commenters on the 2012 MTP/SCS was the impact of the plan on collision reduction/prevention. However, a challenge arises for SACOG in forecasting where and how frequently collisions might occur over the 20-year life of the plan, or where they might increase or decrease as a result of projects in the MTP/SCS. Several tools have been developed that attempt to predict collisions, described below.

1. Pedestrian Danger Index

Summary

The Pedestrian Danger Index (PDI) estimates the likelihood that a pedestrian will be fatally struck by a vehicle in a given area. The PDI relies on three variables:

- a. Raw number of traffic fatalities;
- b. Appropriate target area population; and
- c. Percentage of walking commuters.

In the PDI metric, the percentage of walking commuters is used as a proxy for the prevalence of pedestrian mode choice overall. The PDI is generated by the following equation:

$$((\text{Pedestrian Fatalities}/\text{Target Area Population}) * 100,000) / \% \text{ of Commuters Walking to Work}$$

Initial SACOG Assessment

- This index is better suited to areas with a large number of walking commuters.
- The raw number of traffic fatalities can be found using SWITRS for a specific location.
- Mode choice statistics may be derived from American Communities Survey (ACS) data.
- Some local agencies and SACOG do not have detailed estimates of walking commuters.
- The measure is essentially skewed by the number of pedestrians on the road; the more pedestrians, the more projected accidents.

- The methodology doesn't account for new investment in planned or future pedestrian improvements.

Source

<http://www.smartgrowthamerica.org/documents/dangerous-by-design-2014/dangerous-by-design-2014.pdf>

2. San Francisco Vehicle-Pedestrian Injury Model

Summary

The San Francisco Department of Health (SFDPH) developed the San Francisco Vehicle-Pedestrian Injury Model in collaboration with the UC Berkeley School of Public Health. The model seeks to project changes in the number of collisions with pedestrian injuries or fatalities resulting from area-level development or transportation system changes. The model currently uses the following census-tract level variables:

- Traffic volume
- Arterial streets (% , without MUNI Transit)
- Neighborhood commercial areas (% , land area)
- Land area (square miles)
- Employee population
- Resident population
- Below poverty level (% , population)
- Age 65 and older (% , population)

The primary goal for this modeling is to help inform land use and transportation planning by identifying areas with safety mitigation and improvement needs to reduce pedestrian-involved collisions.

Initial SACOG Assessment

- The tool seeks to identify “hot spots” where improvements could be most needed or effective to reduce collisions involving pedestrians.
- The tool is better suited to areas with a high numbers of pedestrians.
- The tool has been useful for health impact assessments and conducting detailed neighborhood level assessments.

Source

<http://www.sfhealthequity.org/elements/24-elements/tools/108-pedestrian-injury-model>

F. Crime and Active Mode Choices

A number of studies have sought to assess the impact of crime levels and *perceived* crime levels on modal choices. Examination of this effect could inform policy decisions and strategies to promote walking and biking.

A 2009 Dissertation, *Unraveling the Complexity of Land Use and Travel Behavior Relationships: A Four-Part Quantitative Case Study of the South Bay Area of Los Angeles*, found that violent crime – but not property

crime – has a significant negative impact on walking trips across all sociodemographic groups, both whites and non-whites, even after controlling for built environment variables.

The Mineta Transportation Institute at California State University, San Jose, investigated the impact of crime on travel behavior in a number of communities in the Bay Area. After testing a number of research methodologies and variables, the study found that high rates of violent crime in the neighborhood increase automobile use as well as transit use, which was noted as a surprise to the authors. The authors “attributed this finding to the fact that while driving and, to some extent, transit offer some level of protection from neighborhood crime, walkers and cyclists feel more exposed in these same neighborhoods.” The authors termed this the Neighborhood Exposure Hypothesis. They also noted that,

A simplistic assessment of these findings may lead to the conclusion that we may be able to increase transit use by adding additional transit services to high-crime neighborhoods. However, the Neighborhood Exposure Hypothesis and our findings that high-crime neighborhoods also encourage residents to drive instead of walk or ride a bike to transit, suggest that transit-oriented development plans that do not address the safety concerns of residents will fall short in reducing auto trips.⁵

The authors recommended further research using more fine-grained analysis and larger data sets to confirm or expand insights.

Initial SACOG Assessment

- These studies suggest a more nuanced approach to active transportation choices and public safety in neighborhoods with high crime levels.
- Different police and sheriff’s departments in the region provide crime data to different crime mapping sites. For example, SACOG found that crimemapping.com includes data from the Placer County Sheriff and the police departments of Roseville, West Sacramento, and Woodland, whereas RAIDSonline.com showed Sacramento data. The Sacramento police department also randomly offsets crime locations so as not to identify exact addresses.
- Staff was not able to locate crime data from a number of other jurisdictions in the region, although they may be available.
- For this approach to be valuable at a regional scale, SACOG would need to determine a methodology for obtaining data and identifying and assessing “high-crime neighborhoods” in the region and how best to use that information.

Sources

Dissertation: <https://escholarship.org/uc/item/6hz4b9xj>

Mineta Study: <http://transweb.sjsu.edu/PDFs/research/2802-Neighborhood-Crime-Travel-Mode-Behavior.pdf>

⁵ Mineta Transportation Institute, Neighborhood Crime and Travel Behavior: An Investigation of the Influence of Neighborhood Crime Rates on Mode Choice – Phase II, MTI Report, 11-04, p. 69.

G. Climate Adaptation

The Health in All Policies Task Force includes as part of its Healthy Communities Framework the ability to “adapt to changing environments, resilient, and prepared for emergencies.” The Healthy Communities Data and Indicators Project includes indicators for climate and infrastructure hazard mitigation.

The SACOG Board of Directors adopted a Sacramento Region Transportation Climate Adaptation Plan in August 2015. The plan contains a vulnerability assessment, policy recommendations, and a series of implementation actions for addressing potential risks to the region’s transportation infrastructure from climate change. Next steps include: carrying out an asset level vulnerability assessment on the region’s most critical transportation investments to determine best possible adaptation strategies; and working with the Board to determine how climate adaptation should be addressed in the biennial regional funding round given the outputs from the asset level assessment.

The Institute for Sustainable Communities issued an Emerging Issues Brief on Measuring Performance of Adaptation Initiatives. The brief notes that, “Adaptation practitioners across the world have been challenged with finding clear, efficient and relatively inexpensive ways to measure, monitor and evaluate progress on the success or failure of climate adaptation strategies.” The brief cites the efforts of the City of Chicago to develop adaptation performance indicators, including tracking of how closely predicted impacts match observed events; tracking the extent to which the city has implemented adaptation actions to address risks and vulnerabilities; and measures for how well the city has increased its resilience.

SACOG is just beginning its action steps, so will follow the efforts of cities like Chicago to see what could be applicable from their work.

Source

<http://sustainablecommunitiesleadershipacademy.org/resources/?view-all=0&sort=city&type=climate-adaptation-and-resilience>

H. Disadvantaged Communities

An increasing focus of both federal and state government has been on disadvantaged communities. Recent examples include:

- The Federal Transit Administration in 2012 issued a new Title VI circular, expanding guidance for Title VI transportation and minority population analysis compared with the environmental justice analysis of low-income and high minority communities required for regional transportation plans (See Chapter 8 – Equity and Choice and Appendix C-5 for more detail on these analyses.)
- U.S. Secretary of Transportation Anthony Foxx has spearheaded the incorporation of “Ladders of Opportunity” into numerous federal Department of Transportation programs to help communities design and build transportation projects and offer public transportation services in a way that connects people to job centers and education, that revitalizes economically distressed neighborhoods, and that creates pathways to good jobs.

- The Department of Housing and Urban Development (HUD) asked recipients of its Sustainable Communities Regional Planning grants to conduct an analysis of impediments to fair housing, including assessing the presence of “Racially or Ethnically Concentrated Areas of Poverty,” or RCAPs/ECAPs in their areas.
- On behalf of the California Environmental Protection Agency (CalEPA), the state Office of Environmental Health Hazard Assessment (OEHHA) in October 2014 released Version 2.0 of the California Communities Environmental Health Screening Tool (CalEnviroScreen). CalEnviroScreen is a screening methodology to help identify local communities that are disproportionately burdened by multiple pollution sources. The state Cap-and-Trade program has incorporated EnviroScreen into the Affordable Housing and Sustainable Communities program criteria.

Each of these programs utilizes a different definition for disadvantaged communities:

- HUD defines an RCAP/ECAP as any census tract with a family poverty rate at or above 40% OR at or above 300% of the metro tract average (whichever is less); and a majority non-white population (>50%).
- SACOG found that these communities represent a subset of the Low Income High Minority (LIHM) Areas that SACOG identified for the MTP/SCS environmental justice analysis SACOG’s funding round uses as a scoring criteria whether a project is located in or serves a LIHM Area. (See Appendix C-5 for more detail on LIHM Area methodology).
- Although being used for a funding program for affordable housing and transit-oriented development projects, the EnviroScreen methodology heavily weights areas with poor drinking water quality, solid and hazardous waste facilities, businesses that emit toxic pollutants, impaired water bodies, etc. EnviroScreen results in another different geography in the Sacramento region, based on a number of dimensions that SACOG in its regional role cannot very effectively address.

These varying definitions make it challenging for SACOG to develop a consistent approach to analyzing disadvantaged communities in the region, or for local jurisdictions in the region to compete effectively for federal or state funding.

Setting aside this challenge, SACOG continues to explore tools and metrics concerning a number of topic areas that relate to improving public health, transportation and opportunities for disadvantaged populations in the region, including housing and access to health care and healthy food.

H1. HOUSING

The proportion of income that households spend on housing and transportation has an impact on their ability to afford food, utilities, medical and dental care, and other items that affect their health. Housing that is substandard or overcrowded can also impact health. Not surprisingly, new residential growth and affordability in the region are key interests of housing advocates. SACOG received numerous comments on the 2012 MTP/SCS expressing interest in the quantity, type and location of affordable housing resulting from the plan.

As described in more detail in Chapter 3: Land Use Forecast, SACOG forecasts residential growth based on local land use plans, population projections, and market factors. However, despite state

requirements for local housing element and zoning updates to meet regional housing needs allocations, SACOG is unable to project more specifically the quantity or type of affordable housing that may be built over the life of the plan, such as units targeted to large families or seniors.

Through funding from the Sustainable Communities Regional Planning grant, SACOG undertook a report on the MTP/SCS and the region's housing market coming out of the recession. This included developing an inventory of subsidized units and analysis of housing cost burden and affordability challenges in the region.

SACOG continues to explore tools that could support increased analytical or monitoring capacity related to housing in the region, as discussed below.

1. Location Affordability Portal

Summary

The Location Affordability Portal is a joint project of the US Departments of Housing and Urban Development and Transportation, as part of the Partnership for Sustainable Communities, to help decision-makers and the public understand, and ultimately reduce, the combined housing and transportation cost burden borne by American families.

A Location Affordability Index estimates the percentage of a family's income dedicated to the combined cost of housing and transportation in a given location. Estimates are provided for eight different household profiles defined by income, size, and number of commuters. Results are expressed in terms of the percent of income that median-income family households (renter, owner or combined) would spend for housing and transportation, plus on average, how many vehicles they would own, how many annual miles they would drive, and how many transit trips they would take annually.

The My Transportation Cost Calculator allows users to customize information from the Location Affordability Index by entering personal information. Results provided are estimates of transportation costs. The calculator can be used to compare costs in different locations and understand the impacts of individual choice

Initial SACOG Assessment

- The portal is a good tool for comparing housing and transportation costs nationally.
- If the methodology remains consistent, this could potentially be a tool to help SACOG monitor the region's affordability over time.

Source

<http://www.locationaffordability.info/>

2. Jobs-Housing Fit

Summary

As described in more detail in plan Chapter 9: Economic Vitality, SACOG currently uses the ratio of jobs to housing to measure progress towards a jobs-housing balance within a four-mile area around regional job centers. However, as part of our HUD grant work, staff also worked to develop

a more specific jobs-housing “fit” methodology intended to answer the question: based on the wages paid at employment centers in the region, is a worker likely to find an affordable place to live within a short commute distance? The concept of comparing local wage levels and housing costs or prices may seem fairly straightforward. In reality, it has proved to be quite a challenge.

As an initial approach to defining jobs-housing fit, SACOG staff identified the following data needs and methodological questions:

Data needs:

- Number of jobs in employment centers and number of dwellings (or households) within a short commute of those centers.
- Distribution of wages paid at employment centers.
- Distribution of housing prices (or costs) within a short commute of employment centers.

Methodological questions:

- How to translate wages at workplaces to likely household income.
- How to deal with overlapping commute sheds for employment centers.
- Whether to base the housing analysis on housing average *cost*, i.e., the amount current owners/tenants pay for their housing; or housing *price*, i.e., the amount that a new resident would have to pay to rent or buy a place to live near the employment center.
- Whether to analyze both for-sale and rental housing or just rental housing.

The number of jobs and dwellings (or households) within the four-mile commute sheds around the centers was available through SACOG’s base year estimates.⁶ Ideally, wages could then be measured for jobs within each employment center, looking at industry sectors, occupations, and wage levels at either an employer or parcel level. However, the data sources on distribution of wages paid at employment centers were limited and flawed in basic ways.

The following are several sources of employment information. However, as indicated, most are not available at small enough geographies to allow refined measurements with reasonable degrees of confidence:

- Quarterly Census of Employment and Wages (QCEW) collected by the Bureau of Labor Statistics; only available at the county, MSA, state and national levels, and cannot be broken out for employment centers.
- Census Bureau’s Longitudinal Employment Household Dynamics (LEHD) Program; provides employment estimates at the level of County or Census Designated Place (CDP), but CDP sizes vary significantly in the SACOG region, from entire cities to small rural areas.
- California Employment Development Department (EDD) California Regional Economies Employment (CREE) Series; provides non-confidential annual average employment and wage data but only at a county level. CREE suppresses some of the data if it is determined to be necessary to protect the identity or identifiable information of a cooperating employer.

⁶ Every four years, SACOG updates its estimates of employment and housing units within the SACOG region as a base for preparing the MTP/SCS. The 2008 update was the base for the analysis described here. These estimates do not include any information on wages.

- Census Bureau’s American Communities Survey (ACS) Public Use Microdata Sample (PUMS) files.
- SACOG employment inventory.⁷

Because of these data challenges, SACOG tested an employment-at-workplace synthesis approach. However, in checking the reasonableness of the synthesis for total wages and average wages compared with other sources, staff found significant variations.

Initial SACOG Assessment

Based on this test, SACOG staff identified numerous problems with the synthesis methodology, including:

- For most counties, the variations between the synthetic and actual ACS and EDD data were 20 percent or higher.
- The variations in average wages were small across the region, but would be expected to be larger, given the variations in the region’s six counties.
- Because the ACS is a sample, and because of the rural nature of some of the region, there were significant margins of error with some of the data.
- Housing cost/price data is limited and is generally aggregated at the zip code level, which does not match four-mile commute shed geographies.

For these reasons, SACOG staff concluded it was not reasonable to pursue this particular approach further. SACOG continues to explore if there is another more promising methodology or other options for more detailed wage and housing cost/price data.

3. Center for Regional Change Jobs-Housing Fit Approach

Summary

A different approach was led by Dr. Chris Benner for the UC Davis Center for Regional Change (CRC).⁸ The CRC methodology sought to determine a ratio between low wage jobs and affordable rentals at a city level or below.

The CRC effort used 2011 LEHD data for Census Designated Places (CDPs) for its wage information. LEHD combines data from EDD base wage files (ES-202 files) with individual and demographic data from Census and other datasets to provide synthesized wage data. LEHD provides wage information in three categories: earnings of \$1,250/month or less; earnings of \$1,251/month to \$3,333/month; and earnings of greater than \$3,333/month. For its methodology, CRC defines low-wage jobs as those with earnings of \$1,250/month or less. For each CDP in California, CRC used LEHD data to provide a total number of jobs and the number of jobs paying \$1,250 or less per month.

On the housing side of the equation, CRC assumed two earners per household, each working at \$1,250/month, for total household earnings of \$2,500/month (\$30,000/year). Housing cost

⁷ SACOG’s employment inventory is built from a parcel record-level review of the establishment-level, employment base provided by InfoGroup geocoded to parcels and reconciled with SACOG’s public sector employment estimates.

⁸ <http://mappingregionalchange.ucdavis.edu/jobshousingfit2011>

affordability is defined as 30% of household earnings. Based on this affordability percentage, affordable rental units were defined as those renting at less than \$750/month, and affordable ownership units as owner-occupied or vacant for-sale housing units valued at less than \$150,000.⁹ Using 2007-2011 ACS data, CRC provided an estimate of the total number of rentals priced at less than \$750/month and the total number of ownership homes valued at less than \$150,000 in each CDP. CRC then calculated a low wage job to affordable home ratio for each CDP by dividing the total number of low wage jobs by the total number of affordable rental units.

Initial SACOG Assessment

CRC's work identifies places in the region with more limited rental affordability, suggesting that areas with a ratio of 2:1 or less have a reasonable ratio of low-wage jobs to affordable rental units; areas with ratios of 2:1 to 4:1 may be worth investigating in more depth; and areas with ratios over 4:1 have at most half as many affordable rentals as would be considered reasonable to accommodate low-wage employees. SACOG staff identified a few limitations with this approach:

- The low rung of LEHD data is up to \$1,250/month. LEHD does not differentiate between part-time and full-time work, but for full-time work, this monthly wage would equate to less than California's legal minimum of \$9.00/hour.
- The middle income tier is between \$1,251/month (\$15,012/year) and \$3,333/month (\$39,996/year) and the top income tier is all income over \$3,333/month, which includes 47% of workers across the region. The limitations caused by the lack of more precise income categories available from the LEHD limit the usability for middle and upper income levels.
- The methodology assumed households with two people working at \$1,250/month each, but CRC noted, "This is probably a generous estimate of affordability, since the average household in California has approximately 1.4 income earners."¹⁰ It could be more likely that the lowest income households double up or have more workers than the average household in the region, but CRC did not provide information to that effect.

Source

<http://explore.regionalchange.ucdavis.edu/news-and-events/news/jobs-housing-fit-maps-and-analysis-for-california-cities>

SACOG staff believes there is still merit in the jobs-housing fit concept, and sees a number of potential next steps involved for continuing to pursue a methodology for the SACOG region. These include seeking other sources of micro-level employment/wage data and housing cost data and/or potential larger data purchases with other interested regions.

^{9,6} CA_PLACES_JHFIT_Tables_Unlinkedm Read Me tab, found at <http://mappingregionalchange.ucdavis.edu/node/559>

H2. Health Care Access

The Health in All Policies (HiAP) Task Force includes affordable, accessible and high quality health care in its framework for what a healthy community provides for all residents. As described in more detail in Chapter 8: Equity and Choice, the MTP/SCS currently measures increased access to medical jobs from LIHM and Non-LIHM Areas. As noted, this does not necessarily measure changes in access to medical *care*, because even if a medical facility is nearby, it may not be where someone actually receives their health care services.

One key challenge is how to determine where people actually obtain their health care, since people have different insurance plans and the Health Insurance Portability and Accountability Act (HIPAA) includes strict privacy rules for patient information. Another issue for the MTP/SCS is the ability to project future medical locations other than new hospitals, which take many years to plan and construct. SACOG is continuing to consult with health care providers and Medi-Cal on potential ways to obtain the data necessary to assess transportation needs to health and mental health care for residents for whom transportation is a critical barrier.

H3. Access to Healthy Food

The Healthy Indicators project notes that, “An adequate, nutritious diet is a necessity at all stages of life. ...Low income families are less likely to have a nutritious diet than those with higher incomes. Peoples’ food choices and their likelihood of being overweight or obese are also influenced by their food environment: the foods available in their neighborhoods including stores, restaurants, schools, and worksites.”¹¹ A related interest of numerous commenters on the 2012 MTP/SCS was the impact of the plan on access to healthy food across the region.

In 2013, through funding from the SGC, SACOG completed an initial food desert mapping study. As defined in Appendix E-2: Rural Urban Connections Strategy, food deserts are “areas characterized by relatively poor access to healthy and affordable food” that may contribute to “social disparities in diet and diet-related health outcomes, such as cardiovascular disease and obesity.”¹²

SACOG’s initial study included 308 grocery stores, farmers markets and locally serving farms with Community Supported Agriculture (CSA) or U-Pick programs, and included low-income, minority, and vulnerable communities defined in the MTP/SCS. If residents could reach a grocery store within 15 minutes via walking, bicycling, light rail transit and/or personal vehicle, they were considered to have “good access.” Communities that could not reach a food outlet within 15 minutes were considered to have “poor access.” Several other tools seek to identify food deserts or imbalance areas using different methodologies.

¹¹ PDF on Access to Healthy Foods at <http://www.cdph.ca.gov/programs/Pages/HealthyCommunityIndicators.aspx#DataIndAv>

¹² http://www.cdc.gov/pcd/issues/2009/jul/08_0163.htm

1. Baltimore 2015 Food Environment Map

Summary

The Baltimore Food Policy Initiative (BFPI), an intergovernmental collaboration on food access and systems, and the Johns Hopkins Center for a Livable Future (CLF) developed the Baltimore Food Environment Map to identify food deserts in the city of Baltimore.

The city defines a food desert as an area where the distance to a supermarket or supermarket alternative is more than 1/4 mile; the median household income is at or below 185% of the Federal Poverty Level; over 30% of households have no vehicle available; and the average Healthy Food Availability Index (HFAI) score for all food stores is low.

To develop HFAI scores, CLF obtained a food permit list from the Baltimore City Health Department in August 2011, which included all sites that sold food, such as stores, restaurants, farmers' market stands and street carts. All 900 known stores were physically surveyed, with scores collected using an adapted version of the NEMS-S (Nutrition Environment Measures Survey in Stores) tool. The NEMS-S tool, developed by researchers at the Rollins School of Public Health at Emory University, measures the healthy food environment of food retailers from grocery to convenience stores. HFAI scores range from 0 to 28.5; a higher score indicates the greater availability of healthy and whole foods. Smaller groceries and public markets were considered supermarket alternatives if they had an HFAI score of 25 or higher. Figure 7 from the report shows the variation and average scores received by the different types of food retailers in the city.

Figure 7. Healthy Food Availability by Retailer Type¹³

CATEGORIES OF FOOD RETAIL	NUMBER	HFAI SCORE	
	SURVEYED	RANGE	AVERAGE
SUPERMARKET	45	22.5-28.5	27.1
SMALL GROCERIES AND CORNER STORES	453	0-22.5	9.79
CONVENIENCE STORES	300	0-15.5	6.3
PUBLIC MARKETS	6	4-22.5	16.67

Maps were produced for the City as a whole, and for individual City Council districts. The analysis and report helped the city create or refine additional strategies, including:

- A comprehensive Food Desert Retail Strategy to support and encourage all food retailers to provide healthy food;
- Providing residents in senior, disabled, and public housing in food deserts the opportunity to purchase groceries online through a Virtual Supermarket Program;
- Improving healthy food offerings in historic public markets; and
- Linking food access to Homegrown Baltimore, an urban agriculture strategy to encourage residents to grow, buy and eat local food.

¹³ Mapping Baltimore City's Food Environment: 2015 Report, p. 31

Initial SACOG Assessment

- This was a comprehensive assessment of food deserts, based on on-site surveys of the offerings of about 85 percent of all food retailers in the city. The methodology includes not only large grocery stores and farmer's markets, but also small grocery/corner stores, some of which scored well.
- The methodology includes income and vehicle ownership measures.
- The methodology defines access as a quarter-mile walk, but does not include other modal access, such as by transit or bike.
- Johns Hopkins was able to spearhead the visits to each food retailer for scoring. It would likely be difficult for a jurisdiction and certainly for SACOG to undertake such an intensive on-site survey effort without significant help or volunteer support.

Source

<http://mdfoodsystemmap.org/2015-baltimore-city-food-access-map/>

2. Modified Food Retail Index (mRFEI)

Summary:

CDPH and the University of California San Francisco undertook a Modified Retail Food Environment Index (mRFEI) assessment for California. The mRFEI is a tool for identifying food imbalance areas – areas with concentrations of fast food outlets and convenience stores, but limited access to healthy and affordable food.

The mRFEI yields a percentage measure at the census tract or higher level, using the formula:
$$\text{mRFEI} = 100 * \frac{\# \text{ of healthy food retailers}}{\# \text{ of healthy} + \# \text{ of unhealthy food retailers}}$$

The Centers for Disease Control (CDC) provided the percentage of healthy food retailers based on NAICS codes for California census tracts in 2000. Healthy food retailers were defined as supermarkets, larger grocery stores, supercenters, and produce stores within a census tract or a half-mile from the tract boundary. Less healthy food retailers were defined as fast food restaurants, small grocery stores, and convenience stores within a census tract or half-mile from the tract boundary. Regions were defined by the counties in MPO regions as of 2010.

Resulting maps were based on four ranges, highlighting areas below the state average of 12.2 percent, at the state average to 1.5 times the average, 1.5-2 times the state average, or 2+ times the state average. County averages of the percentage of healthy food retailers in census tracts were also weighted by race/ethnicity for counties, regions, and the state.

Initial SACOG Assessment

- The mRFEI seeks to provide a simple-to-understand measure – the percent of the primary food retailers in a defined geography that provide healthy food.
- The methodology subjectively assigns restaurants and small stores to less healthy categories without consideration of the specific consumer choices provided at different sites.
- The mRFEI does not consider travel distances.

- Although the Baltimore study found that some small international and corner stores do provide healthy and whole foods, the mRFEI defines all small grocery stores as less healthy food retailers.

Source

Access to Healthy Food PDF

at <http://www.cdph.ca.gov/programs/Pages/HealthyCommunityIndicators.aspx#DataIndAv>

SACOG is now working on two fronts to update its initial food desert work for the Sacramento region: by studying food deserts and imbalance areas to assess potential transportation strategies to help people reach existing quality food outlets, and by identifying where healthy food outlets are most needed to bring food to residents with limited access. This information can help our region's transit and transportation planners and economic development departments with planning transportation options or new food access locations or delivery systems. SACOG also anticipates developing a process to monitor changes in food deserts and imbalance areas as the MTP/SCS is updated every four years.

Conclusion/Next Steps

The wealth of guidance, information and options for tools, performance measures and metrics for assessing active transportation and public health activities and outcomes seems to be growing exponentially. A Florida study on alternatives to Level of Service identified over 200 performance metrics related to ecological impact, accessibility, non-SOV travel, reducing congestion, optimizing freight movement, enhancing safety, and reducing air pollution.¹⁴ A new guide released in April 2015 by AARP, Smart Growth America, and the National Complete Streets Coalition identifies a wide range of measures for evaluating complete streets, including metrics related to access, the economy, environment, place, safety, equity, and health.¹⁵ Senate Bill 743 (Steinberg, 2013) required the Governor's Office of Planning and Research (OPR) to amend California Environmental Quality Act (CEQA) guidelines to provide an alternative to LOS for evaluating transportation impacts. OPR issued a Preliminary Evaluation of Alternative Methods of Transportation Analysis in December 2013 and a SB 743 Guidelines Discussion Draft in August 2014.¹⁶ OPR received many comments and is still working with stakeholders on revising the final guidance.

A study of livability programs conducted by San Jose State University's Mineta Transportation Institute reported on a wide range of different approaches to livability performance measurement by various MPOs.¹⁷ The study makes an important point about choosing performance measures:

¹⁴ Transportation Research Center, University of Florida, Expanded Transportation Performance Measures to Supplement Level of Service (LOS) for Growth Management and Transportation Impact Analysis, <http://www.trb.org/Main/Blurbs/168098.aspx>

¹⁵ Evaluating Complete Streets Projects: A Guide for Practitioners.

<http://www.smartgrowthamerica.org/2015/04/02/evaluating-complete-streets-projects-a-guide-for-practitioners-now-available/>

¹⁶ Found at http://opr.ca.gov/s_ceqaguidelines.php

¹⁷ Mineta Transportation Institute, Measuring the Performance of Livability Programs, <http://transweb.sjsu.edu/project/1126.html>

[L]ivable neighborhoods are more than the sum of their parts – a densely populated neighborhood that is not accessible to jobs or a mixed-use neighborhood that is not safe would not be called livable by any actual residents. ...[W]hat differentiates a good measurement program from a great one is whether it captures the whole, or simply captures – and thus incentivizes – some subset of disjointed parts. If measures are truly efficacious, then we must measure all of what we seek. If we only seek to justify what we have already done, we will never learn what we lack.¹⁸

The scan summarized in this appendix represents SACOG staff's initial assessments of a range of tools and measures related to active transportation and health – broadly defined. The appendix has described some of SACOG's plans to move forward with exploring further some of these methodologies and metrics. In addition, SACOG anticipates:

- Considering how some of these tools might help support a new technical assistance program for local jurisdictions on improving and balancing modes on large arterial corridors in the region to support infill development and revitalization.
- Building on this research to help craft a regional complete streets funding program. In February 2015, the SACOG Board expressed general support for staff further developing the concept for a Regional Complete Streets Program. The concept will require coordination with partner agencies and stakeholders, and considerable analysis to develop strong performance measures and selection criteria to ensure the program helps member agencies be competitive for cap-and-trade and other funding sources, and can complement existing funding programs at SACOG, EDCTC, and PCTPA.
- More generally assessing the various tools and methodologies for:
 - Making revisions to SACOG's regional funding programs.
 - Monitoring MTP/SCS implementation over time.
 - Measuring the potential future effects of subsequent MTP/SCS.

¹⁸ Ibid, p. 55.